Contents Volume 24:1 February 2001

Thelen, E., Schöner, G., Scheier, C. & Smith, L. B. The dynamics of embodiment: A field theory of infant perseverative reaching **1**

Open Peer Commentary

Berger, S.E. Accounting for infant perseveration beyond the manual search task 34

Burns, M. & Domjan, M. Plus maze experiments and the boundary conditions of the dynamic field model 35

Cisek, P. Embodiment is all in the head 36

Diamond, A. Looking closely at infants' performance and experimental procedures in the A-not-B task 38

Dounskaia, N. & Stelmach, G.E. Movement planning and movement execution: What is in between? 41

Freeman, W. J. The behavior-cognition link is well done; the cognition-brain link needs more work 42

Glenberg, A.M, Cowart, M.R. & Kaschak, M.P. An affordance field for guiding movement and cognition 43

Hailman, J.P. Why the Piagetian A-not-B phenomenon is no error: A comparative perspective 44

Harter, D., Graesser, A.C. & Franklin, S. Bridging the gap: Dynamics as a unified view of cognition 45

Latash, M.L. Mirror writing: Adults making A-not-B errors? 46

Lewis, M.D. Self-organizing brains don't develop gradually 47

Lockman, J.J. An embodied theory of cognitive development: Within reach? 48

Marcovitch, S. & Zelazo, P. D. On the need for conscious control and conceptual understanding 48

Mareschal, D. Can there be embodiment without a body/brain? 49

Markman, A.B. Are dynamical systems the answer? 50

McCollum, G. Navigating the complex dynamics of memory and desire: Mathematics accommodates continuous and conditional dynamics 51

McCune, L. Is a field theory of perseverative reaching compatible with a Piagetian view? 53

McDonough, L. Infants reach to location A without practice or training 54

Michel, G.F. What is embodied: "A-not-B error" or delayed-response learning? 54

Müller, U. & Carpendale, J.I.M. Objectivity, intentionality, and levels of explanation 55

Munakata, Y., Sahni, S.D. & Yerys, B.E. An embodied theory in search of a body: Challenges for a dynamic systems model of infant perseveration 56

Newcombe, N.S. A spatial coding analysis of the A-not-B error: What IS "Location at A"? 57

Newton, N. The role of action representations in the dynamics of embodied cognition 58

Pelphrey, K.A. & Reznick, J.S. Clothing a model of embodiment 59

Roberts, P.D. Cooperaive field theory is critical for embodiment 59

Ruffman, T. Understanding A-not-B errors as a function of object representation and deficits in attention rather than motor memories 61

Sophian, C. Does cognitive development move beyond sensorimotor intelligence? 61

Spencer, J.P. The essence of cognitive development 62

Staddon, J.E.R., Machado, A. & Lourenço, O. *Plus ça change. . .*: Jost, Piaget, and the dynamics of embodiment 63

Takeshita, H. Dynamic comparison of the development of combinatory manipulations between chimpanzee and human infants 65

Tschacher, W. & Junghan, U.M. Next step, synergetics? 66

Valenti, S.S. & Stoffregen, T.A. The social dynamics of embodied cognition 67

Vindras, P. & Gentaz, E. Do adults make A-not-B errors in pointing? 68

Authors' Response

Thelen, E., Schöner, G., Scheier, C. & Smith, L. B. So what's a modeler to do? 70

Cowan, N. The magical number 4 in short-term memory: A reconsideration of mental storage capacity **87**

Open Peer Commentary

Avons, S.E., Ward, G. & Russo, R. The dangers of taking capacity limits too literally 114

Baars, B.J. A biocognitive approach to the conscious core of immediate memory 115

Bachelder, B.L. The magical number 4 = 7: Span theory on capacity limitations 116

Baddeley, A. The magic number and the episodic buffer 117

Beaman, C.P. The size and nature of a chunk 118

Davis, G. There is no four-object limit on attention 119

Ericsson, K.A. & Kirk, E.P. The search for fixed generalizable limits of "pure STM" capacity: Problems with theoretical proposals based on independent chunks 120

Gratton, G., Fabiani, M. & Corballis, P.M. Working memory capacity and the hemispheric organization of the brain 121

Grondin, S. A temporal account of the limited processing capacity 122

Halford, G.S., Phillips, S. & Wilson, W.H. Processing capacity limits are not explained by storage limits 123

Hecht, S.A. & Shackelford, T.K. Pure short-term memory capacity has implication for understanding individual differences in math skills 124

Jensen, O. & Lisman, J.E. Dual oscillations as the physiological basis for capacity limits 126

Jou, J. The magic number four: Can it explain Sternberg's serial memory scan data? 126

Kawai, N. & Matsuzawa, T. "Magical number 5" in a chimpanzee 127

Lane, P.C.R., Gobet, F. & Cheng, P.C.-H. What forms the chunks in a subject's performance? Lessons from the CHREST computational model of learning 128

McElree, B. & Dosher, B.A. The focus of attention across space and across time 129

McKone, E. Capacity limits in continuous old-new recognition and in short-term implicit memory 130

Milner, P.M. Magical attention 131
Morra, S. Nothing left in store . . . but how do we measure attentional capacity? 132
Murray, D.J. Partial matching theory and the memory span 133
Muter, P. The nature of forgetting from short-term memory 134
Nairne, J.S. & Neath, I. Long-term memory span 134
Oades, R.D. & Jemel, B. Where the magic breaks down: Boundaries and the "focus-of-attention" in schizophrenia 135
Pascual-Leone, J. If the magical number is 4, how does one account for operations within working memory? 136
Pothos, E.M. & Juola, P. Linguistic structure and short-term memory 138
Raffone, A., Wolters, G. & Murre, J.M. A neurophysiological account of working memory limits: Between-item segregation and within-chunk integration 139
Rensink, R.A. Four-sight in hindsight: The existence of magical numbers in vision 141
Roelfsema, P.R. & Lamme, V.A.F. Which brain mechanism cannot count beyond four? 142
Rypma, B. & Gabrieli, J.D.E. Functional neuroimaging of short-term memory: The neural mechanisms of mental storage 143
Schneider, W.X., Deubel, H. & Wesenick, M.-B. Characterizing chunks in visual short-term memory: Not more than one feature per dimension? 144
Scholl, B.J. & Xu, Y. The magical number 4 in vision 145
Schubert, T. & Frensch, P.A. How unitary is the capacity-limited attentional focus? 146
Taatgen, N.A. Dispelling the magic: Towards memory without capacity 147
Tiitinen, H. How to interface cognitive psychology with cognitive neuroscience? 148
Todt, D. Studies of STM properties in animals may help us better understand the nature of our own storage limitations: The case of birdsong acquisition 149
Towse, J.N. Memory limits: "Give us an answer!" 150
Usher, M., Cohen, J.D., Haarmann, H. & Horn, D. Neural mechanism for the magical number 4: Competitive interactions and nonlinear oscillation 151
Wilding, J. Over the top: Are there exceptions to the basic capacity limit? 152
Woodman, G.F., Vogel, E.K. & Luck, S.J. Attention is not unitary 153

Author's Response
Cowan, N. Metatheory of storage capacity limits 154

Continuing Commentary

On Jeffrey A. Gray (1995). The contents of consciousness: A neuropsychological conjecture. BBS 18:659–722. 187

Duch, W. Facing the hard question 187
Joseph, M.H. & Joseph, S.R.H. The contents of consciousness: From C to shining C++ 188
Merfeld, D.M. Must all action halt during sensorimotor mismatch? 189
Vine, I. Motivating consciousness 190

Author's Response
Gray, J. No easy answers to hard or easy questions 191

Erratum
Todd, P.M. & Gigerenzer, G. Précis of *Simple heuristics that make us smart* 194

Contents Volume 24:2 April 2001

Stoffregen, T. A. & Bardy, B. G. On specification and the senses **195**

Open Peer Commentary

Adolph, K. E., Marin, L. M. & Fraisse, F. F. Learning and exploration: Lessons from infants 213
Ahrens, K. P. Physiological convergence of sensory signals as a prelude to perception 214
Brenner, E. & Smeets, J. B. J. We are better off without perfect perception 215
Burton, G. A. How many systems make a global array? 216
Cabe, P. A. Absolutist array specification and species survival: An ecological perspective on ecological perception 217
Coello, Y. & Rossetti, Y. The patterns of energy used for action are task-dependent 218
Costall, A., Parovel, G. & Sinico, M. Getting real about invariants 219
Feldman, A. G. & Lestienne, F. C. With either separate or integrated arrays of senses, perception may not be direct 220
Flom, R. A. & Bahrick, L. E. The global array: Not new to infant researchers 221
Foo, P. & Kelso, J. A. S. Goal directed meaning connects perception and specification 222
Hughes, B. Specification, information, and the loss of receptor systems 223
Kujala, T. Brain science: A more direct way of understanding our senses 224
Leighty, K. A., Cummins-Sebree, S. E. & Fragaszy, D. M. Expanding the theory: Nonverbal determination of referents in a joystick task 224
Lewkowicz, D. J. & Scheier, C. Situating situated multimodal perception: The relevance of global arrays to development 225
Mace, W. M. Amodal specifying information: Where is occlusion? 226
Mark, L. S. Toward a strategy for demonstrating the perceptual independence of the global array from individual sensory arrays 227
McMichael, K. & Bingham, G. Functional separation of the senses is a requirement of perception/action research 227
Mergner, T. & Becker, W. A different way to combine direct perception with intersensory interaction 228
Michaels, C. F. & Oudejans, R. D. Energy, information, detection, and action 230
Myin, E. Fragmentation, coherence, and the perception/action divide 231
Neelson, M. F. & Jenison, R. L. Act globally, think locally 231
Oie, K. S. & Jeka, J. J. Input-driven behavior: One extreme of the multisensory perceptual continuum 232
Pailhous, J., Varrine, E. & Bonnard, M. Is the brain specified? 233
Pallas, S. L. Cortical specification makes sense 234
Peper, C. E. & Beek, P. J. Direct perception of global invariants is not a fruitful notion 235
Pickering, J. How important is specificity? 235
Pittenger, J. B. Three consequences of believing that information lies in global arrays and that perceptual systems use this information 236
Ricco, G. E., van Emmerik, E. A. & Peters, B. T. Movement dynamics and the environment to be perceived 237
Riley, M. A. Inadequate information and deficient perception 238
Rosenblum, L. D. & Gordon, M. S. The generality of specificity: Some lessons from audiovisual speech 239
Runeson, S., Jacobs, D. M., Andersson, I. E. K. & Kreegipuu, K. Specificity is always contingent on constraints: Global versus individual arrays is not the issue 240
Thomas, N. J. T. Perceptual systems: Five+, one, or many? 241
Vereijken, B. & Whiting, H. T. A. "The assumption of separate senses": Pervasive? Perhaps – Persuasive? Hardly 242
Wade, N. J. Abolition of the senses 243
Walker-Andrews, A. Infants too are global perceivers 244
Wertheim, A. H. Motion, frames of reference, dead horses, and metaphysics 245

Authors' Response

Stoffregen, T. A. & Bardy, B. G. Specification in the global array 246

Finlay B. L., Darlington, R. B. & Nicastro, N. Developmental structure in brain evolution **263**

Open Peer Commentary

Aboitiz, F. What determines evolutionary brain growth? 278
Airey, D. C. & Williams, R. W. Quantitative neurogenetic perspectives 279
Bach-y-Rita, P. & Aiello, G. L. Brain energetics and evolution 280
Barton, R. A. The coordinated structure of mosaic brain evolution 281
Deaner, R. O. & van Schaik, C. P. Flaws in evolutionary theory and interpretation 282
Dunbar, R. I. M. Confounding explanations . . . 283
Elliott, T. D'Arcy Wentworth Thompson, inter-individual variation, and post-natal neuronal growth 284
Gilissen, E. & Simmons, R. M. T. Brain evolution: A matter of constraints and permissions? 284
Holloway, R. L. Does allometry mask important brain structure residuals relevant to species-specific behavioral evolution? 286
Innocenti, G. M. The time when the "Tomte" of evolution was playing with time 287
Iwaniuk, A. N. & Whishaw, I. Q. The spandrel may be related to culture not brain function 288
Kaas, J. H. & Collins, C. E. Variability in the sizes of brain parts 288
Lovejoy, C. O. Hominid brain expansion and reproductive success 290

Marino, L. Cetaceans would be an interesting comparison group 290
Ragir, S. Changes in perinatal conditions selected for neonatal immaturity 291
Rilling, J. K. Allometric departures for the human brain provide insights into hominid brain evolution 292
Schoenemann, P. T. Brain scaling, behavioral ability, and human evolution 293
Stout, D. Constraint and adaptation in primate brain evolution 295
Striedter, G. F. Brain evolution: How constrained is it? 296
Wilczynski, W. Brain allometry: Correlation variation in cytoarchitectonics and neurochemistry? 297

Authors' Response

Finlay, B. L., Darlington, R. B. & Nicastro, C. Developmental structure in brain evolution 298

Rendel, L. & Whitehead, H. Culture in whales and dolphins **309**

Open Peer Commentary

Barkow, J. H. Culture and hyperculture: Why can't a cetacean be more like a (hu)man? 324
Barrett-Lennard, L. G. Deecke, V. B., Yurk, H. & Ford, J. K. B. A sound approach to the study of culture 325
Bauer, G. B. & Harley, H. E. The mimetic dolphin 326
Blute, M. Social learning by observation is analogue, instruction is digital 327
Boesch, C. Sacrileges are welcome in science! Opening a discussion about culture in animals 327
Brown, W. M. Genomic imprinting and culture in mammals 328
Connor, C. R. Individual foraging specialization in marine mammals: Culture and ecology 329
Day, R. L., Kendal, J. R. & Laland, K. N. Validating cultural transmission in cetaceans 330
Deputte, B. L. Culture in cetaceans: Why put the cart before the horse? 331
Dunbar, R. I. M. So how *do* they do it? 332
Fox, M. A. Cetaecean culture: Philosophical implications 333
Freeberg, T. M. Communicative cultures in cetaceans: Big questions are unanswered, functional analyses are needed 334
Galef, Jr., B. G. Where's the beef? Evidence of culture, imitation, and teaching, in cetaceans? 335
Herman, L. M. & Pack, A. A. Laboratory evidence for cultural transmission mechanisms 335
Ingold, T. The use and abuse of ethnography 337
Janik, V. M. Is cetacean social learning unique? 337
Kako, E. The promise of an ecological, evolutionary approach to culture and language 338
Knight, C. Does cultural evolution need matriliny? 339
Kuczaj, S. Cetacean culture: Slippery when wet 340
Lynn, S. K. & Pepperberg, I. M. Culture: In the beak of the beholder? 341
Maestripieri, D. & Whitham, J. Teaching in marine mammals? Anecdotes versus science 342
Mann, J. Cetacean culture: Definitions and evidence 343
Mayer-Kress, G. & Porter, M. A. Remarks on whale cultures from a complex systems perspective 344
Mercado III, E. & DeLong, C. M. Experiments are the key to understanding socially acquired knowledge in cetaceans 345
Mesnick, S. L. Genetic relatedness in sperm whales: Evidence and cultural implications 346
Miller, P. J. O. Cetacean science does not have to be pseudo-science 347
Mitchell, R. W. On not drawing the line about culture: Inconsistencies in interpretation of nonhuman cultures 348
O'Malley, R. C. Parallels and contrasts with primate cultural research 349
Poirier, F. E. & Fitton, L. J. Primate cultural worlds: Monkeys, apes, and humans 349
Premack, D. & Hauser, M. D. A whale of a tale: Calling it culture doesn't help 350
Pryor, K. W. Cultural transmission of behavior in animals: How a modern training technology uses spontaneous social imitation in cetaceans and facilitates social imitation in horses and dogs 352
Rauch, A. Cetacean culture: Resisting myths and addressing lacunae 352
Reader, S. M. & Lefebvre, L. Social learning and sociality 353
Ripoll, T. & Vauclair, J. Can culture be inferred only from the absence of genetican environmental actors? 354
Slater, P. J. B. There's CULTURE and "Culture" 356
Thomas, R. Marine versus terrestrial variability in relation to social learning 357
Tschudin, A. J-P. C. Getting at animal culture: The interface of experimental and ethnographic evidence in dolphins 357
Tyack, P. L. Cetacean culture: Humans of the sea? 358
Whiten, A. Imitation and cultural transmission in apes and cetaceans 359

Authors' Response

Rendell L. & Whitehead H. Cetacean culture: Still afloat after the first naval engagement of the culture wars 360

Contents Volume 24:3 June 2001

Hertwig, R. & Ortmann, A. Experimental practices in economics: A methodological challenge for psychologists? **383**

Open Peer Commentary

Baron, J. Purpose and methods 403
Betsch, T. & Haberstroh, S. Financial incentives do not pave the road to good experimentation 404
Blaich, C. F. & Barreto, H. Typological thinking, statistical significance, and the methodological divergence of experimental psychology and economics 405
Davis, P. D. & Durham R. L. Economic and psychological experimental methodology: Separating the wheat from the chaff 405
Erev, I. On accumulation of information and model selection 406
Fantino, E. & Stolarz-Fantino, S. Behavioral and economic approaches to decision making: A common ground 407
Gigerenzer, G. Are we losing control? 408
Gil-White, F. J. A good experiment of choice behavior is a good caricature of a real situation 409
Gillies, A. S. & Rigdon, M. Theory-testing experiments in the economics laboratory 410
Gintis, H. The contribution of game theory to experimental design in the behavioral sciences 411
Goodie, A. S. Are scripts of deception necessary when repeated trials are used? On the social context of psychological experiments 412
Guala, F. Clear-cut designs versus the uniformity of experimental practice 412
Harrison, G. W. & Rutström, E. E. Doing it both ways – experimental practice and heuristic context 413
Henrich, J. Challenges for everyone: Real people, deception, one-shot games, social learning, and computers 414
Hilton, D. J. Is the challenge for psychologists to return to behaviourism? 415
Hogarth, R. M. To what are we trying to generalize? 416
Holt, C. A. & Laury, S. K. Varying the scale of financial incentives under real and hypothetical conditions 417
Huettel, S. A. & Lockhead G. Variability is not uniformly bad: The practices of psychologists generate research questions 418
Kühberger, A. Why use real and hypothetical payoffs? 419
Kurzban, R. Are experimental economists behaviorists and is behaviorism for the birds? 420
Lecoutre, M-P. & Lecoutre, B. Other scientific purposes, other methodological ways 421
Levine, D. S. In partial defense of softness 421
Maratsos, M. We should not impose narrow restrictions on psychological methods 422
Markman, A. B. Choice output and choice processing: An analogy to similarity 423
McKenzie, C. R. M. & Wixted, J. T. Participant skepticism: If you can't beat it, model it 424
Rakow, T. Theorize it both ways? 425
Ross, D. The game-theoretic innocence of experimental behavioral psychology 426
Roth, A. E. Form and function in experimental design 427
Smith, V. L. From old issues to new directions in experimental psychology 428
Suleiman, R. Different perspective of human behavior entail different experimental practices 429
Van Vugt, M. V. Self-interest as self-fulfilling prophecy 429
Weber, E. U. Meta-theory rather than method fascism 430
Weiss, D. J. Deception by researchers is necessary and not necessarily evil 431
Zizzo, D. J. individual psychology, market scaffolding, and behavioral tests 432

Author's Response

Hertwig, R. & Ortmann, A. Money, lies, and replicability: On the need for empirically grounded experimental practices and interdisciplinary discourse 433

Humphreys, G. W. & Forde, E. M. E. Hierarchies, similarity, and interactivity in object recognition: "Category-specific" neuropsychological deficits **453**

Open Peer Commentary

Arguin, M. & Saumier, D. Shortcomings of the HIT framework and possible solutions 476
Arterberry, M. E. Making living versus nonliving distinctions: Lessons from infants 477
Barrett, H. C. Is category specificity in the world or in the mind? 478
Bub, D. & Bukach, C. Limitations on current explanations of category-specific agnosia 479
Cree, G. S. & McRae, K. Beyond the sensory/functional dichotomy 480
Davidoff, J. Category-specific deficits: Will a simpler model do? 481
De Almeida, R. G. Conceptual deficits without features: A view from atomism 482
Graf, M. & Schneider, W. X. Structural descriptions in HIT – a problematic commitment 483
Lamberts, K. Category-specific deficits and exemplar models 484
Lambon Ralph, M. A. & Garrard, P. Category-specific deficits: Insights from semantic dementia and Alzheimer's disease 485

Laws, K. R. What is structural similarity and is it greater in living things? 486
Leek, E. C. & Pothos, E. M. What is specific about category specificity? Fractionating patterns of impairments and the spurious living/nonliving dichotomy 487
Mahon, B. & Caramazza, A. The sensory/functional assumption or the data: Which do we keep? 488
Pillon, A. & Samson, D. On disentangling and weighting kinds of semantic knowledge. 490
Pulvermüller, F. Mutual access and mutual dependence of conceptual components 490
Saffran, E. M. & Coslett H. B. Further evidence in support of a distributed semantic memory system 492
Tanaka, J. Where are object properties? In the world or in the mind? 493
Thioux, M., Turconi, E., Palmers, E. & Seron, X. About numbers as a semantic category 494
Tyler, L. K. & Moss, H. E. Concepts and categories: What is the evidence for neural specialisation? 495
Zaitchik, D. & Solomon, G. E. A. Putting semantics back into the semantic representation of living things 496

Author's Response

Humphreys, G. W. & Forde, E. M. E. Category specificity in mind and brain? 497

Hull, D. L., Langman, R. E. & Glenn, S. S. A general account of selection: Biology, immunology, and behavior **511**

Open Peer Commentary

Baum, W. M. Two stumbling blocks to a general account of selection: Replication and information 528
Bevins, R. A. Should we essentially ignore the role of stimuli in a general account of operant selection? 528
Blute, M. A single-process learning theory 529
Burgos, J. E. A neural-network interpretation of selection in learning and behavior 531
Catania, A. C. Selection as a cause versus the causes of selection 533
Chiesa, M. Does terminology from biology work in the realm of operant behavior? 533
Cziko, G. A. Heeding Darwin but ignoring Bernard: External behaviors are not selected, internal goals are 534
Eacker, J. N. Selection and unification of science 535
Eckerman, D. A. & Kemp, S. M. Selection: Unexplored and underexplored realms 536
Glassman, M. Replication or reproduction?: Symbiogenesis as an alternative theory 537
Godfrey-Smith, P. The role of information and replication in selection processes 538
Grantham, T. Do operant behaviors replicate? 538
Heschl, A. Natural selection and metaphors of "selection" 539
Hesse, B. E. & Novak, G. On the origins of complexity 540
Hineline, P. N. Sharing terms and concepts under the selectionist umbrella: Difficult but worthwhile 541
Leslie, J. C. Selection in operant learning may fit a general model 542
Madden, G. J. Concerns of old, revisited 543
Malott, R. W. Operant learning and selectionism: Risks and benefits of seeking interdisciplinary parallels 544
Matthen, M. How (and why) Darwinian selection restricts environmental feedback 545
McSweeney, F. K. & Aoyama, K. Evolution and operant behavior, metaphor or theory? 545
Moore, J. Operant behavior and the thesis of "selection by consequences" 546
Nanay, B. A more pluralist typology of selection processes 547
Okasha, S. "Which processes are selection processes?" 548
Pennypacker, H. S. Are theories of selection necessary? 549
Pepper, J. W. & Knudsen, T. Selection without multiple replicators? 550
Pierce, W. D. Activity anorexia: Biological, behavioral, and neural levels of selection 551
Reeke, G. N. Replication in selective systems: Multiplicity of carriers, variation of information, iteration of encounters 552
Rotenberg, V. S. Variations and active versus reactive behavior as factors of the selection processes 553
Simonton, D. K. Creativity as cognitive selection: The blind-variation and selective-retention model 554
Skipper, Jr., R. A. The casual crux of selection 556
Spiga, R. Selection: Information and replication of the operant 556
Thompson, N. S. Avoiding vicious circularity requires more that a modicum of care 557
Tonneau, F. & Sokolowski, M. B. C. Is operant selectionism coherent? 558
Vaidya, M. Are units of retention necessary? 559

Author's Response

Hull, D. L., Langman, R. E. & Glenn, S. S. At last: Serious consideration 559

Errata **575**

Contents Volume 24:4 August 2001

Maloney, L.T., Mausfeld, R. & Heyer, D. Introduction to the Special Issue on the Work of Roger Shepard: The Case for Cognitive Universals **579**
Shepard, R. N. Perceptual-cognitive universals as reflections of the world **581**
Barlow, H. The exploitation of regularities in the environment by the brain **602**
Hecht, H. Regularities of the physical world and the absence of their internalization **608**
Kubovy, M. & Epstein, W. Internalization: A metaphor we can live without **618**
Schwartz, R. Evolutionary internalized regularities **626**
Tenenbaum, J. B. & Griffiths, T. L. Generalization, similarity, and Bayesian inference **629**
Todorovič, D. Is kinematic geometry an internalized regularity? **641**

Open Peer Commentary

Baddeley, R., Osorio, D. & Jones, C. D. Colour generalisation by domestic chicks 654
Bedford, F. L. Generality, mathematical elegance, and evolution of numerical/object identity 654
Bertamini, M. If a tree falls in the forest and there is nobody around, does Chasles' theorem still apply? 655
Boroditsky, L. & Ramscar, M. "First, we assume a spherical cow . . . " 656
Brill, M. H. Color constancy: A case for multiple levels and paradigms 658
Bruno, N. & Westland, S. Colour perception may optimize biologically relevant surface discriminations – rather than type-I constancy 658
Chater, N., Vitányi, P. M. B. & Stewart, N. Universal generalization and universal inter-item confusability 659
Cheng, K. Generalization and Tinbergen's four whys 660
Decock, L. & van Brakel, J. Which colour space(s) is Shepard talking about? 661
Dowe, D. & Oppy, G. Universal Bayesian inference? 662
Dresp, B. External regularities and adaptive signal exchanges in the brain 663
Edelman, S. Neural spaces: A general framework for the understanding of cognition? 664
Foster, D. H. Natural groups of transformations underlying apparent motion and perceived object shape and color 665
Frank, T. D., Daffertshofer, A. & Beek, P. J. Interpreting screw displacement apparent motion as a self-organizing process 668
Gentner, D. Exhuming similarity 669
Gerbino, W. The place of Shepard in the world of perception 669
Gold, I. The evolution of color vision 671
Heil, J. What are we talking about here? 671
Heit, E. What is the probability of the Bayesian model, given the data? 672
Heschl, A. Adaptation as genetic internalization 673
Hoffman, W. C. Group theory and geometric psychology 674
Hood, B. Learning to internalize: A developmental perspective 676
Intraub, H. Internalized constraints in the representation of spatial layout 677
Jacobs, D. M., Runeson, S. & Andersson, I. E. K. Reliance on constraints means detection of information 679
Kaiser, M. K. What is internalized? 680
Krist, H. The internalization of physical constraints from a developmental perspective 681
Kurthen, M. The archeology of internalism 682
Lacquaniti, F. & Zago, M. Internalization of physical laws as revealed by the study of action instead of perception 684
Lee, M. D. Extending Bayesian concept learning to deal with representational complexity and adaptation 685
Lomas, D. Representation of basic kinds: Not a case of evolutionary internalization of *universal* regularities 686
Love, B. C. Three deadly sins of category learning modelers 687
Massaro, D. W. Tribute to an ideal exemplar of scientist and person 688
Mausfeld, R. What's within? Can the internal structure of perception be derived from regularities of the external world? 689
Movellan, J. R. & Nelson, J. D. Probabilistic functionalism: A unifying paradigm for the cognitive sciences 690
Niall, K. K. Beyond an occult kinematics of the mind 692
O'Brien, G. & Opie J. Functional resemblance and the internalization of rules 695
Pani, J. R. The mathematics of symmetry does not provide an appropriate model for the human understanding of elementary motions 696
Parsons, L. M. Evaluating spatial transformation procedures as universals 697
Pickering, J. Reflections on what timescale? 698
Pothos, E. M. Context effects equally applicable in generalization and similarity 699
Pribram, K. H. Shepard's pie: The other half 700
Raffone, A., Belardinelli, M. O. & van Leeuwen, C. Regularities, context, and neural coding: Are universals reflected in the experienced world? 701
Schwartz, D. A. An alternate route toward a science of mind 702
Sokolov, E. N. Sphericity in cognition 703
Todd, P. M. & Gigerenzer, G. Shepard's mirrors or Simon's scissors? 704
Todorovič, D. Measurement theory is a poor model of the relation of kinematic geometry and perception of motion 705
Vallortigara, G. & Tommasi, L. Minimization of modal contours: An instance of an evolutionary internalized geometric regularity? 706
Vickers, D. Towards a generative transformational approach to visual perception 707
Whitmyer, V. What's in a structure? 708
Wilson, A. & Bingham, G. P. Dynamics, not kinematics, is an adequate basis for perception 709

Wilson, M. Internalized constraints may function as an emulator 710
Zimmer, A. C. Why perception is veridical 711

Authors' Responses

Shepard, R. N. On the possibility of universal mental laws: A reply to my critics 712
Barlow, H. The role of statistics in perception 748
Hecht, H. Universal internalization or pluralistic micro-theories? 749
Kubovy, M. & Epstein, W. Internalization: A metaphor we can live without 756
Schwartz, R. Regularities in motion: Apparent, real, and internalized 757
Tenenbaum, J. B. & Griffiths, T. L. Some specifics about generalization 762
Todorovič, D. Is kinematic geometry an internalized regularity? 778

Contents Volume 24:5 October 2001

Tsuda, I. Toward an interpretation of dynamic neural activity in terms of chaotic dynamical systems **793**

Open Peer Commentary

Aihara, K. & Ryeu, J.K. Chaotic neurons and analog computation 810
Banerjee, A. The roles played by external input and synaptic modulations in the dynamics of neuronal systems 811
Borisyuk, R. The puzzle of chaotic neurodynamics 812
Breakspear, M. & Friston, K. Symmetries and itineracy in nonlinear systems with many degrees of freedom 813
Dinse, H.R. Multiple and variant time scales in dynamic information processing 814
Érdi, P. How to construct a brain theory? 815
Foster, J.K. Cantor coding and chaotic itinerancy: Relevance for episodic memory, amnesia, and the hippocampus? 815
Freeman, W.J. Noise-driven attractor landscapes for perception by mesoscopic brain dynamics 816
Heath, R.A. Control of chaos and memory dynamics 817
Ikegami, T. & Tani, J. Chaotic itinerancy needs embodied cognition to explain memory dynamics 818
Kay, L.M. Chaotic itinerancy: Insufficient perceptual evidence 819
Kowalik, Z.J. The noise of chaos 820
Kozma, R. Fragmented attractor boundaries in the Kill model of sensory information processing: A potential evidence of Cantor encoding in cognitive processes 820
Liljenström, H. How (dis)ordered is our brain? 821
Mandell, A.J. & Selz, K.A. Network stabilization on unstable manifolds: Computing with middle layer transients 822
Molnár, M. Low-dimensional versus high-dimensional chaos in brain function – is it an and/or issue? 823
Quoy, M., Banquet, J.-P. & Daucé, E. Learning and control with chaos: From biology to robotics 824
Raffone, A. & van Leeuwen, C. Chaos and neural coding: Is the binding problem a pseduo-problem? 826
Rowe, D.L. Dynamic neural activity as chaotic itinerancy or heteroclinic cycles? 827
Rowe, D.L. & Wright, J. Using experimental data and analysis in EEG modeling 828

Author's Response

Tsuda, I. The plausibility of a chaotic brain theory 829

Hommel, B., Müsseler, J., Aschersleben, G. & Prinz, W. The Theory of Event Coding (TEC): A framework for perception and action planning **849**

Open Peer Commentary

Bryson, J. Intelligent control requires more structure than the Theory of Event Coding provides 878
Chaminade, T. & Decety, J. A common framework for perception and action: Neuroimaging evidence 879
Chown, E., Booker, L. B. & Kaplan, S. Perception, action planning, and cognitive maps 882
Cisek, P. & Kalaska, J.F. Common codes for situated interaction 883
Diedrichsen, J. & Hazeltine, E. Unifying by binding: Will binding really bind? 884
Dinse, H.R. Modified action as a determinant of adult and age-related sensorimotor integration: Where does it begin? 885
Galantucci, B., Fowler, C.A. & Turvey, M.T. Event coding as feature guessing: The lessons of the motor theory of speech perception 886
Hartsuiker, R.J. & Pickering, M.J. A common framework for language comprehension and language production? 887
Hochberg, J. TEC – Some problems and some prospects 888
Ivanoff, J. & Klein, R. Attending, intending, and the importance of task settings 889
Jordan, J.S. The Theory of Event Coding (TEC)'s framework may leave perception out of the picture 890
Kim, N.-G. & Effken, J.A. Ecological information and prospective control without mental representation 890
Kunde, W. Exploring the hyphen in ideo-motor action 891
Lane, P.C.R., Cheng, P.C.-H. & Gobet, F. The CHREST model of active perception and its role in problem solving 892
Meiran, N. Event coding, executive control, and task-switching 893
Millikan, R.G. A theory of representation to complement TEC 894
Oades, R.D. & Kreul, K. Anomalous processing in schizophrenia suggests adaptive event-action coding requires multiple executive brain mechanisms 895
Olivetti Belardinelli, M. & Basso, D. The role of feedforward control in motor planning 896
Oriet, C., Stevanovski, B. & Jolicoeur, P. Theory of event coding: Interesting, but underspecified 897
Pisella, L., Kritikos, A. & Rossetti, Y. Perception, action, and motor control: Interaction does not necessarily imply common structures 898
Proctor, R.W. & Vu, K.-P.L. TEC: Integrated view of perception and action or framework for response selection? 899
Richardson, D.C. & Spivey, M.J. The TEC as a theory of embodied cognition 900
Richardson, M.J. & Michaels, C.F. The event-code: Not the solution to a problem, but a problem to be solved 901
Rosenbaum, D.A. Computational motor planning and the theory of event coding 902
Sanders, A.F. How specific and common is common coding? 903
Shaw, R.E. & Wagman, J.B. Explanatory burdens and natural law: Invoking a field description of perception-action 905
Vogt, S. & Hecht, H. Multi-level sensorimotor interactions 906

Westwood, D.A. & Goodale, M.A. Perception and action planning: Getting it together 907
Wolters, G. & Raffone, A. How are events represented? 908
Zacks, J.M. Scaling up from atomic to complex events 909

Authors' Response
Hommel, B., Müsseler, J., Aschersleben, G. & Prinz, W. Codes and their vicissitudes 910

O'Regan, J.K. & Noë, A. A sensorimotor account of vision and visual consciousness 939

Open Peer Commentary
Editorial commentary 973
Ansorge, U., Scharlau, I., Heumann, M. & Klotz W. Visual conscious perception could be grounded in a nonconscious sensorimotor domain 974
Bach-y-Rita, P. & Hasse, S.J. The role of the brain in perception 975
Bartolomeo, P. & Chokron, S. Visual awareness relies on exogenous orienting of attention: Evidence from unilateral neglect 975
Blackmore, S.J. Three experiments to test the sensorimotor theory of vision 977
Block, N. Behaviorism revisited 977
Broackes, J. Experience, attention, and mental representation 978
Clark, A. & Toribio, J. Sensorimotor chauvinism? 979
Cohen, J. Whither visual representations? Whither qualia? 980
De Graef, P., Verfaillie, K., Germeys, F., Gysen, V. & Van Eccelpoel, C. Trans-saccadic representation makes your Porsche go places 981
Dennett, D.C. Surprise, surprise 982
Fischer, B. Misperceptions dependent on oculomotor activity 982
Gallese, V. & Keysers, C. Mirror neurons: A sensorimotor representation system 983
Goodale, M.A. Real action in a virtual world 984
Hardcastle, V.G. Visual perception is not visual awareness 985
Hochberg, J. In the Mind's Eye: Perceptual coupling and sensorimotor contingencies 986
Humphrey, N. Doing it my way: Sensation, perception – and feeling red 987
Isel, F. How do we account for the absence of "change deafness"? 988
Kim, N.-G. The role of eye movements in perception 988
Kurthen, M. Consciousness as action: The eliminativist sirens are calling 990
Lacquaniti, F. & Zago, M. Does sensorimotor contingency theory account for perceptual-motor dissociations? 991
Laming, D. On the distinction between "sensorimotor" and "motorsensory" contingencies 992
Lamme, V.A.F. & Landman, R. Attention sheds no light on the origin of phenomenal experience 993
Manzotti, R. & Sandini, G. Does functionalism really deal with the phenomenal side of experience? 993
Niebur, E. Sensorimotor contingencies do not replace internal representations, and mastery is not necessary for perception 994
Nusbaum, H.C., Skipper, J.I. & Small, S.L. A sensory-attentional account of speech perception 995
Oberauer, K. The explanatory gap is still there 996
O'Brien, G. & Opie, J. Sins of omission and commission 997
Pani, J.R. Perceptual theories that emphasize action are necessary but not sufficient 998
Pylyshyn, Z.W. Seeing, acting, and knowing 999
Rees, G. & Frith, C. Neural correlates of consciousness are not pictorial representations 999
Revonsuo, A. Dreaming and the place of consciousness in nature 1000
Roberson, G.E., Wallace, M.T. & Schirillo, J.A. The sensorimotor contingency of multisensory localization correlates with the conscious percept of spatial unity 1001
Ryan, J.D. & Cohen, N.J. The existence of internal visual memory representations 1002
Schlesinger, M. Reexamining visual cognition in human infants: On the necessity of representation 1003
Scholl, B.J. & Simons, D.J. Change blindness, Gibson, and the sensorimotor theory of vision 1004
Smeets, J.B.J. & Brenner, E. The absence of representations causes inconsistencies in visual perception 1006
Tatler, B.W. Re-presenting the case for representation 1006
Van Gulick, R. Still room for representations 1007
Velichkovsky, B.M. & Pannasch, S. In search of the ultimate evidence: The fastest visual reaction adapts to environment, not retinal locations 1008
Virsu, V. & Vanni, S. Perceptions as hypotheses of the outside world 1009
Wright, E. A non-epistemic, non-pictorial, internal, material visual field 1010

Authors' Response
O'Regan, J.K. & Noë, A. Acting out our sensory experience 1011

Contents Volume 24:6 December 2001

Webb, B. Can robots make good models of biological behaviour? **1033**

Open Peer Commentary

Balasubramaniam, R. & Feldman, A. G. Some robotic imitations of biological movements can be counterproductive 1050

Banquet, J.-P., Gaussier, P., Quoy, M. & Revel, A. From reflex to planning: Multimodal versatile complex systems in biorobotics 1051

Belzung, C. & Chevalley, C. Models of complexity: The example of emotions 1053

Chang, C. Biorobotics researcher: To be or not to be? 1054

Damper, R. I. Programs, models, theories, and reality 1055

Delcomyn, F. Biorobotic models can contribute to neurobiology 1056

De Lillo, C. Robotic search: What's in it for comparative cognition? 1057

Effken, J. A. & Shaw, R. E. An intentional dynamics approach to comparing robots with their biological targets 1058

Franceschetti, D. R. Biorobotic simulations might offer some advantages over purely computational ones 1058

Franklin, S. Models as implementations of a theory, rather than simulations: Dancing to a different drummer 1059

Giere, R. N. The nature and function of models 1060

Hokland, J. & Vereijken, B. Can robots without Hebbian plasticity make good models of adaptive behaviour? 1060

Jaax, K. N. The usefulness property of biorobotic sensorimotor models: A natural source of prosthetic designs 1062

Killeen, P. R. Doing versus knowing 1062

Kötter, R. Models are better than their theory 1064

Krause, M. A. There is more to biological behavior than causation and control 1065

Lohmann, S. Like the perfect animal, there's no such thing as the perfect institution 1065

MacIver, M. A. How building physical models can reduce and guide the abstraction of nature 1066

Marin, L. & Oullier, O. When robots fail: The complex processes of learning and development 1067

Metta, G. & Sandini, G. Embodiment and complex systems 1068

Midford, P. E. Robots aren't the only physical models 1069

Miller, R. R. & Arcediano, F. Differentiating robotic behavior and artificial intelligence from animal behavior and biological intelligence: Testing structural accuracy 1070

Neumann, T. R., Huber, S. & Bülthoff, H. H. Artificial systems as models in biological cybernetics 1071

Niebur, E., Elhilali, M., Obeid, I., Werfel, J., Blanchard, M., Frasca, M., Ghose, K., Hofstoetter, C., Indiveri, G. & Tilden, M. W. Research, robots, and reality: A statement on current trends in biorobotics 1072

Pepperberg, I. M. The conundrum of correlation and causation 1073

Pickering, J. Living and learning 1074

Reeke, G. N. Modelling criteria: Not just for robots 1074

Schank, J. C. Dimensions of modeling: Generality and integrativeness 1075

Scheutz, M. Is there more to "model" than "muddle"? 1076

Selverston, A. I. Biomimetic robots and biology 1077

Steels, L. The methodology of the artificial 1077

Sugar, T. & McBeath, M. Robotic modeling of mobile ball-catching as a tool for understanding biological interceptive behavior 1078

Young, D. L. & Poon, C.-S. Soul searching and heart throbbing for biological modeling 1080

Author's Response

Webb, B. Robots can be (good) models 1081

Bloom, P. Précis of *How Children Learn the Meanings of Words* **1095**

Open Peer Commentary

Bickerton, D. Okay for content words, but what about functional items? 1104

Gärdenfors, P. Concept modeling, essential properties, and similarity spaces 1105

Garton, A. F. Word meaning, cognitive development, and social interaction 1106

Gogate, L. J. Don't preverbal infants map words onto referents? 1106

Harley, H. & Piattelli-Palmarini, M. Innateness, abstract names, and syntactic cues in How Children Learn the Meanings of Words 1107

Hirsh-Pasek, K., Hennon, E., Golinkoff, R. M., Pence, K., Pulverman, R., Sootsman, J., Pruden, S. & Maguire, M. Social attention need not equal social intention: From attention to intention in early word learning 1108

Jensen, A. R. Vocabulary and general intelligence 1109

Keil, F. C. Good intentions and bad words 1110

Maratsos, M. How fast does a child learn a word? 1111

Murphy, G. L. Fast-mapping children vs. slow-mapping adults: Assumptions about words and concepts in two literatures 1112

Naigles, L. R. Why theories of word learning don't always work as theories of verb learning 1113

Nelson, K. The name game updated 1114

Nolan, R. An ideational account of early word learning: A plausibility assessment 1114

Racsmány, M., Lukács, A., Pléh, C. & Király, I. Some cognitive tools for word learning: The role of working memory and goal preference 1115
Ryder, D. & Favorov, O. V. Empiricist word learning 1117
Scott, S. The other way to learn the meaning of a word 1117
Strauss, S. & Ziv, M. Children request teaching when asking for names of objects 1118
Tomasello, M. Could we please lose the mapping metaphor, please? 1119
Varley, R. & Siegal, M. Words, grammar, and number concepts: Evidence from development and aphasia 1120
Waxman, S. R. Word extension: A key to early word learning and domain-specificity 1121
Westbury, C. & Nicoladis, E. A multiplicity of constraints: How children learn word meaning 1122
Xu, F. & Tenenbaum, J. B. Rational statistical inference: A critical component for word learning 1123

Author's Response
Bloom, P. Controversies in the study of word learning 1124

Continuing Commentary

On Pessoa, L., Thompson, E. & Noë A. (1998) Finding out about filling-in: A guide to perceptual completion for visual science and the philosophy of perception. BBS 21:723–802. 1135

van Lier, R. Visuo-cognitive disambiguation of occluded shapes 1135
Vladusich, T. Perceptual filling-in and the resonant binding of distributed cortical representations 1136

Authors' Response
Pessoa, L., Thompson, E. & Noë, A. Filling-in: One or many? 1137

On Heyes, C. M. (1998) Theory of mind in nonhuman primates. BBS 21:101–148. 1140

Bogdan, R. J. More theory and evolution, please! 1140
Charlton, B. G. Theory of mind and the "somatic marker mechanism" (SMM) 1141
Lurz, R. W. How to solve the distinguishability problem: Triangulation without explicit training 1142

Author's Response
Heyes, C. M. Theory of mind and other domain-specific hypotheses 1143

On Schyns, P. G., Goldstone, R. L. & Thibaut, J.-P. (1998) The development of features in object concepts. BBS 21:1–54. 1146

Dawson, M. R. W. Feature development, object concepts, and the scope slip 1146

Authors' Response
Schyns, P. G., Goldstone, R. L. & Thibaut, J.-P. Functional identification of constraints on feature creation 1147